

March 2022

Labor Market Analysis

Electrician Maintenance Apprenticeship



Prepared by the Central Valley/Mother Lode Center of Excellence

COVID-19 Statement: This report includes employment projection data by Emsi. Emsi's projections are modeled on recorded (historical) employment figures and incorporate several underlying assumptions, including the assumption that the economy during the projection period will be at approximately full employment or potential output. To the extent that a recession or labor shock, such as the economic effects of COVID-19, can cause long-term structural change, they may impact the projections. At this time, it is not possible to quantify the impact of COVID-19 on projections of industry and occupational employment. Other measures such as unemployment rates and monthly industry employment estimates will reflect the most recent information on employment and jobs in the state and, in combination with input from local employers, may help validate current and future employment needs as depicted here.

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Summary

Please note the COVID-19 statement on page 2 when considering this report's findings.

This study conducted by the Central Valley/Mother Lode Center of Excellence examines labor market demand, wages, skills, and postsecondary supply for electrician maintenance apprenticeship. Five occupations related to electrician maintenance apprenticeship were identified for Modesto Junior College:

- 17-3023, Electrical and Electronic Engineering Technologists and Technicians
- 17-3026, Industrial Engineering Technologists and Technicians
- 17-3098, Calibration Technologists and Technicians and Engineering Technologists and Technicians, Except Drafters, All Other
- 49-2094, Electrical and Electronics Repairers, Commercial and Industrial Equipment
- 49-9099, Installation, Maintenance, and Repair Workers, All Other

Key findings:

- **Occupational demand** — Nearly 1,740 workers were employed in jobs related to electrician maintenance apprenticeship in 2020 in the North Central Valley/Northern Mother Lode (NCV/NML) subregion. The largest occupation is installation, maintenance, and repair workers, all other with 1,078 workers, a projected growth rate of 4% over the next five years, and 124 annual openings.
- **Wages** — Calibration technologists and technicians and engineering technologists and technicians, except drafters, all other earn the highest entry-level wage, \$26.36/hour in the subregion.
- **Employers** — Employers with the most job postings in the subregion are Amazon, Rpo International, and Graham Packaging Company.
- **Occupational titles** — The most common occupational title in job postings in the subregion is Industrial Engineering Technicians. The most common job title is Maintenance Technician.
- **Skills and certifications** — The top baseline skill is troubleshooting, the top specialized skill is repair, and the top software skill is Microsoft Excel. The most in-demand certification is a driver's license.
- **Education** — A high school diploma or equivalent is typically required for installation, maintenance, and repair workers, all other. A postsecondary nondegree award is typically required for electrical and electronics repairers, commercial and industrial equipment. An associate's degree is typically required for the remaining three occupations.
- **Supply** — Analysis of postsecondary completions shows that on average 174 awards were conferred in the Central Valley/Mother Lode region each year.

Based on a comparison of occupational demand and supply, there is an undersupply of 146 trained workers in the subregion and 422 workers in the region. The Center of Excellence recommends that Modesto Junior College work with the regional directors, the college's advisory board, and local industry in the expansion of programs to address the shortage of electrician maintenance workers in the region.

Introduction

The Central Valley/Mother Lode Center of Excellence was asked by Modesto Junior College to provide labor market information for electrician maintenance apprenticeship. The geographical focus for this report is the North Central Valley/Northern Mother Lode (NCV/NML) subregion, but regional demand and supply data has been included for broader applicability and use. The average living wage for a single adult in the NCV/NML subregion is \$12.65/hour.¹ Analysis of the program and occupational data related to electrician maintenance apprenticeship resulted in the identification of applicable occupations. The Standard Occupational Classification (SOC) System codes and titles used in this report are:

- 17-3023, Electrical and Electronic Engineering Technologists and Technicians
- 17-3026, Industrial Engineering Technologists and Technicians
- 17-3098, Calibration Technologists and Technicians and Engineering Technologists and Technicians, Except Drafters, All Other
- 49-2094, Electrical and Electronics Repairers, Commercial and Industrial Equipment
- 49-9099, Installation, Maintenance, and Repair Workers, All Other

The occupational titles, job descriptions, sample job titles, and knowledge and skills from the Bureau of Labor Statistics and O*NET OnLine are shown below. There was no O*NET data available for Calibration Technologists and Technicians and Engineering Technologists and Technicians, Except Drafters, All Other and Installation, Maintenance, and Repair Workers, All Other

Electrical and Electronic Engineering Technologists and Technicians

Job Description: Apply electrical and electronic theory and related knowledge, usually under the direction of engineering staff, to design, build, repair, adjust, and modify electrical components, circuitry, controls, and machinery for subsequent evaluation and use by engineering staff in making engineering design decisions.

Knowledge: Computers and Electronics, Engineering and Technology, English Language, Design, Mathematics

Skills: Critical Thinking, Reading Comprehension, Complex Problem Solving, Active Listening, Trouble shooting

Industrial Engineering Technologists and Technicians

Job Description: Apply engineering theory and principles to problems of industrial layout or manufacturing production, usually under the direction of engineering staff. May perform time and motion studies on worker operations in a variety of industries for purposes such as establishing standard production rates or improving efficiency.

Knowledge: Mechanical, Engineering and Technology, Production and Processing, Mathematics, Design

Skills: Reading Comprehension, Active Listening, Critical Thinking, Complex Problem Solving, Monitoring

Electrical and Electronics Repairers, Commercial and Industrial Equipment

Job Description: Repair, test, adjust, or install electronic equipment, such as industrial controls, transmitters, and antennas.

Knowledge: Computers and Electronics, Mechanical, Production and Processing, Customer and Personal Service, Mathematics

Skills: Operations Monitoring, Repairing, Critical Thinking, Equipment Maintenance, Quality Control Analysis

¹ The term "living wage" in Center of Excellence reports is calculated by averaging the self-sufficiency wages from the Insight Center's California Family Needs Calculator for each county in the subregion: <https://insightccd.org/tools-metrics/self-sufficiency-standard-tool-for-california/>.

Occupational Demand

The NCV/NML subregion employed 1,738 workers in electrician maintenance apprenticeship occupations in 2020 (Exhibit 1). The largest occupation is installation, maintenance, and repair workers, all other with 1,078 workers. This occupation is projected to grow by 4% over the next five years and has the greatest number of projected annual openings, 124.

Exhibit 1. Electrician maintenance apprenticeship employment and occupational projections in the NCV/NML subregion

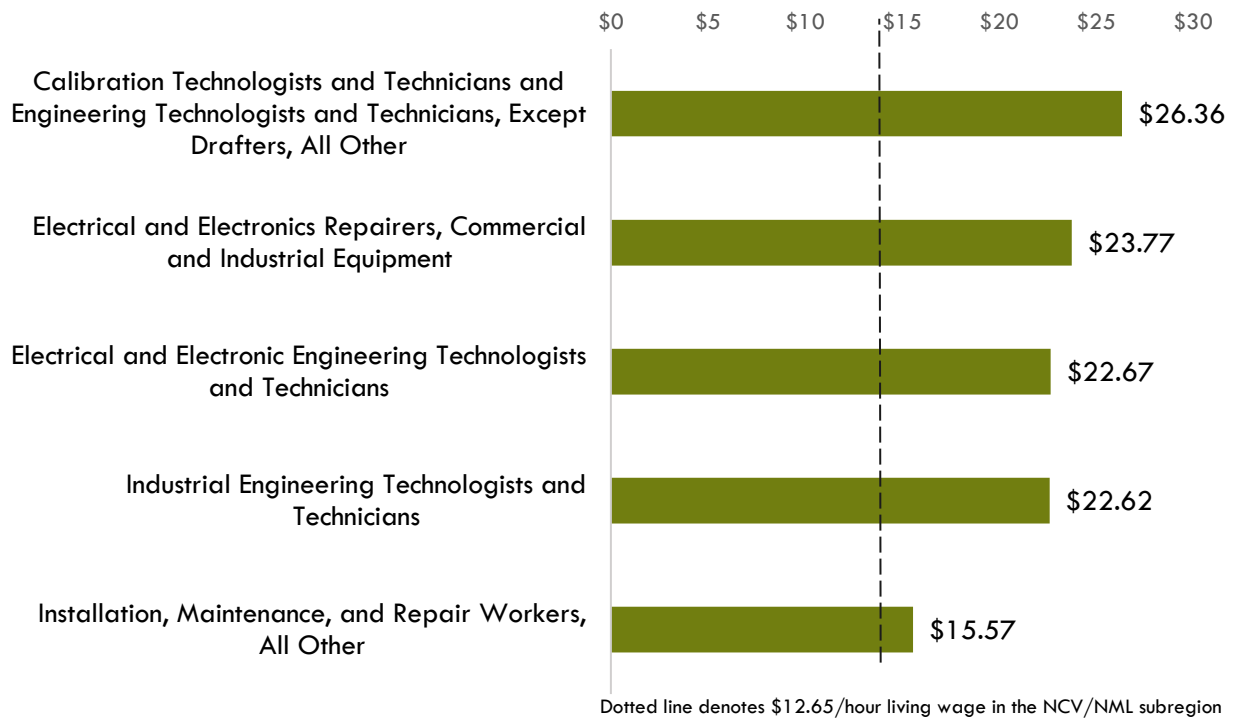
Occupation	2020 Jobs	2025 Jobs	5-Year Change	5-Year % Change	Annual Openings
Installation, Maintenance, and Repair Workers, All Other	1,078	1,127	48	4%	124
Calibration Technologists and Technicians and Engineering Technologists and Technicians, Except Drafters, All Other	198	214	15	8%	22
Electrical and Electronics Repairers, Commercial and Industrial Equipment	210	226	16	8%	20
Electrical and Electronic Engineering Technologists and Technicians	170	186	16	9%	20
Industrial Engineering Technologists and Technicians	81	96	15	18%	11
TOTAL	1,738	1,849	111	6%	196

Wages

Exhibit 2 shows the entry-level hourly wages of the electrician maintenance apprenticeship occupations. Calibration technologists and technicians and engineering technologists and technicians, except drafters, all other earn the highest entry-level wage, \$26.36/hour in the subregion².

² Entry-level wages are derived from the 25th percentile.

Exhibit 2. Electrician maintenance apprenticeship entry-level wages in the NCV/NML subregion



Job Postings

There were 623 job postings for the five occupations in the NCV/NML subregion from September 2021 to February 2022.³ The employers with the most job postings are listed in Exhibit 3.

Exhibit 3. Top employers of electrician maintenance apprenticeship by number of job postings

Employer	Job Postings	% Job Postings
Amazon	31	6%
Rpo International	11	2%
Graham Packaging Company	10	2%
Hupp Draft Services	9	2%
Tesla	9	2%
Danaher Corporation	8	2%
Graham Packaging	8	2%
Rpo Incorporated	8	2%
Aramark	7	1%
Bridgestone / Firestone	7	1%

Exhibit 4 shows how job postings for the targeted occupations in the NCV/NML subregion are distributed across four O*NET OnLine occupations. The occupational title Industrial Engineering Technicians is listed in 464 job postings. Note how this occupational title dominates the job posting results. Common job titles in

³ Other than occupation titles and job titles, the categories below can be counted one or multiple times per job posting, and across several areas in a single posting. For example, a skill can be counted in two different skill types, and an employer can indicate more than one education level.

postings include Maintenance Technician in 112 job postings, Maintenance Technician II in 41 job postings, and Maintenance Mechanic in 34 job postings.

Exhibit 4. Top occupational titles in job postings for electrician maintenance apprenticeship

Occupational Title	Job Postings	% of Job Postings
Industrial Engineering Technicians	464	74%
Electronics Engineering Technicians	90	14%
Installation, Maintenance, and Repair Workers, All Other	54	9%
Electrical Engineering Technicians	15	2%

Salaries

Exhibit 5 shows the “Market Salaries” for electrician maintenance apprenticeship occupations. These are calculated by Burning Glass using a machine learning model built off of millions of job postings every year. This accounts for adjustments based on locations, industry, skills, experience, education requirements, among other variables.

Exhibit 5. Salaries for electrician maintenance apprenticeship occupations

Market Salary Percentile	Salary Amount
10th Percentile	\$22,425
25th Percentile	\$31,478
50th Percentile	\$34,965
75th Percentile	\$37,344
90th Percentile	\$40,343

Education

Of the 623 job postings, 378 listed an education level preferred for the positions being filled. Among those, 81% requested high school or vocational training, 25% requested an associate degree, and 9% requested a bachelor’s degree (Exhibit 6). A job posting can indicate more than one education level. Hence, the percentages shown in the chart below may total more than 100%.

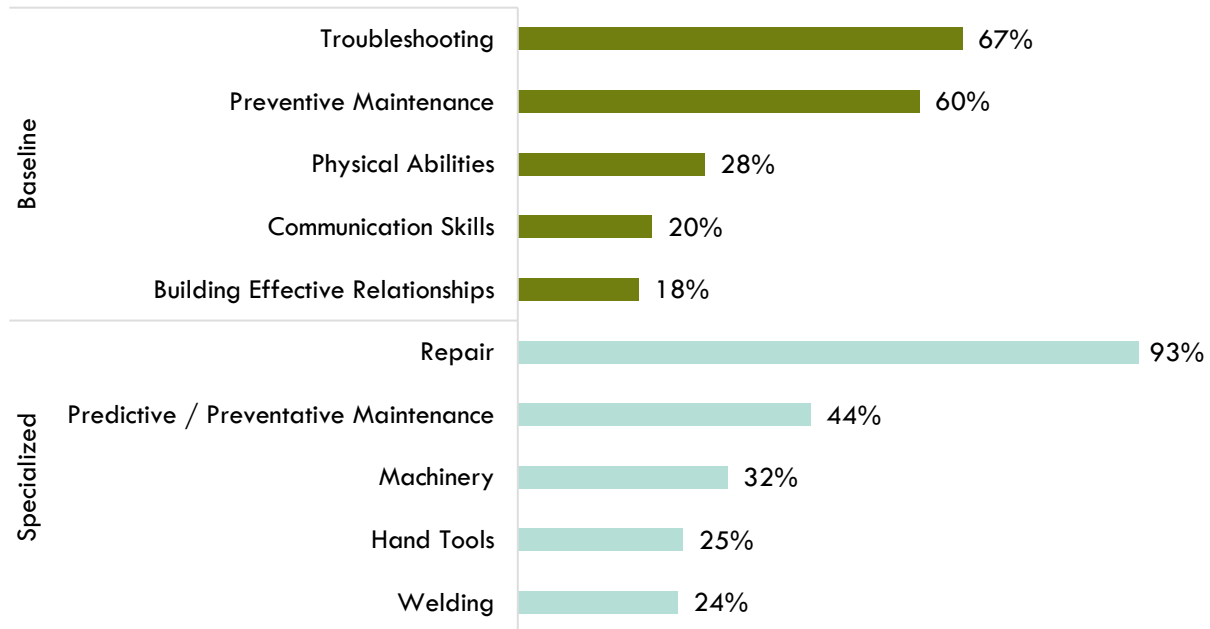
Exhibit 6. Education levels requested in job postings for electrician maintenance apprenticeship

Education Level	Job Postings	% of Job Postings
High school or vocational training	308	81%
Associate's degree	95	25%
Bachelor's degree	35	9%
Master's degree	9	2%
Doctoral degree	2	1%

Baseline and Specialized Skills

Exhibit 7 depicts the top baseline and specialized skills for the targeted occupations. The three most important baseline skills are troubleshooting, 67% of job postings, preventive maintenance, 60%, and physical abilities, 28%. The top three specialized skills are repair, 93% of job postings, predictive/preventative maintenance, 60%, and machinery, 32%.

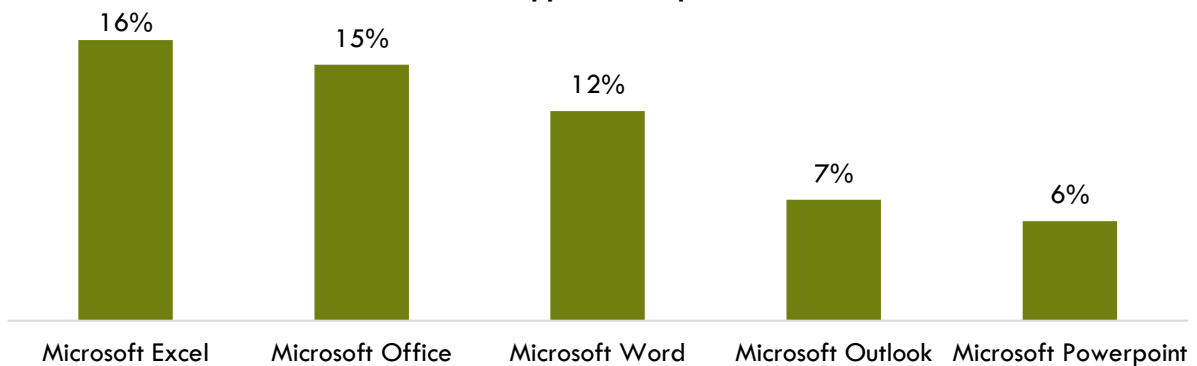
Exhibit 7. In-demand electrician maintenance apprenticeship baseline and specialized skills



Software Skills

Analysis also included the software skills most in demand by employers. Microsoft Excel and Office were the top two software skills identified in job postings (Exhibit 8).

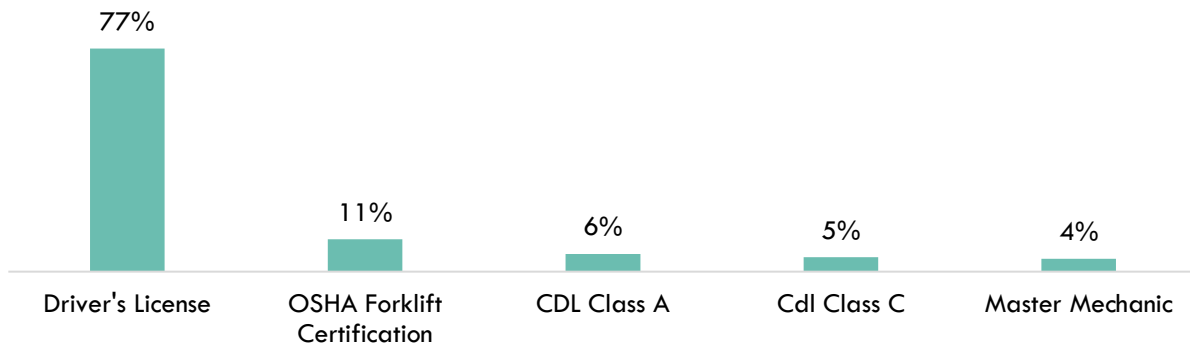
Exhibit 8. In-demand electrician maintenance apprenticeship software skills



Certifications

Of the 623 job postings, 179 contained certification data. Among those, 77% indicated a need for a driver's license. The next top certifications are OSHA Forklift Certification and CDL Class A (Exhibit 9).

Exhibit 9. Top electrician maintenance apprenticeship certifications requested in job postings



Education, Work Experience & Training

A high school diploma or equivalent is typically required for installation, maintenance, and repair workers, all other. A postsecondary nondegree award is typically required for electrical and electronics repairers, commercial and industrial equipment. An associate's degree is typically required for the remaining three occupations (Exhibit 10).

Exhibit 10. Education, work experience, training, and Current Population Survey results for electrician maintenance apprenticeship occupations⁴

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Installation, Maintenance, and Repair Workers, All Other	High school diploma or equivalent	None	Long-term	36.8%
Calibration Technologists and Technicians and Engineering Technologists and Technicians, Except Drafters, All Other	Associate's degree	None	None	50.7%
Electrical and Electronics Repairers, Commercial and Industrial Equipment	Postsecondary nondegree award	None	Long-term	44.4%
Electrical and Electronic Engineering Technologists and Technicians	Associate's degree	None	None	64.2%
Industrial Engineering Technologists and Technicians	Associate's degree	None	None	50.7%

⁴ "Labor Force Statistics from the Current Population Survey," Bureau of Labor Statistics, <https://www.bls.gov/cps/>.

Supply

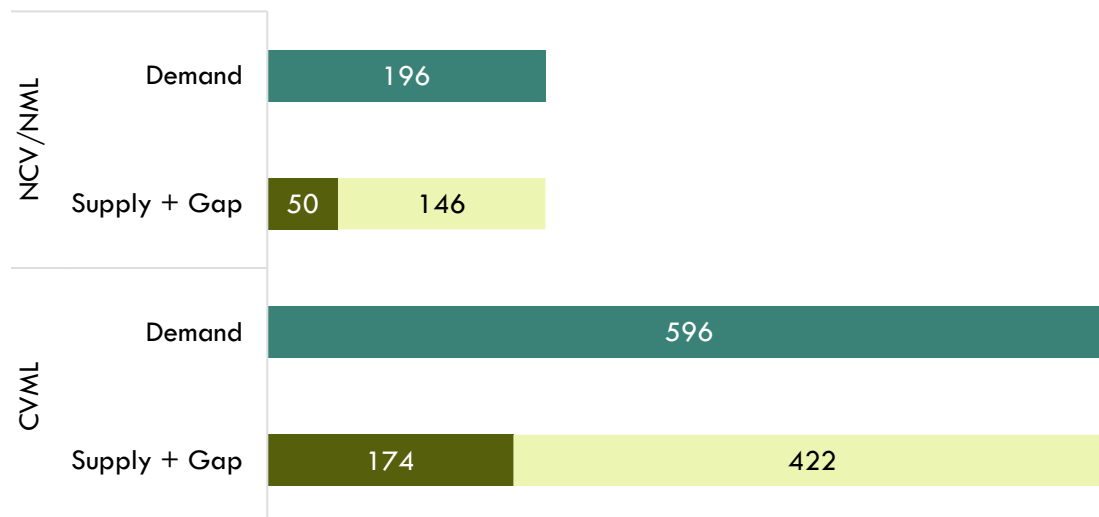
Analysis of program data from the Integrated Postsecondary Education Data System (IPEDS) included the TOP and CIP codes and titles: 093400 - Electronics and Electric Technology, 093410 - Computer Electronics, and 093420 - Industrial Electronics. Analysis of the last three years of data shows that, on average, 174 awards were conferred in the Central Valley/Mother Lode region each year (Exhibit 11).

Exhibit 11. Postsecondary supply for electrician maintenance apprenticeship occupations in the region

TOP/ CIP Code-Title	College	Associate Degree	Certificate 12 < 18 Semester Units	Certificate 16 < 30 Semester Units	Certificate 18 < 30 Semester Units	Certificate 30 < 60 Semester Units	Certificate 6 < 18 Semester Units	Subtotal
093400 - Electronics and Electric Technology	Bakersfield	14				9	50	73
	Fresno City	15		4	1	12		32
	Merced	1				2		3
	San Joaquin Delta					7		7
	Sequoias				1		1	2
093410 - Computer Electronics	Merced	7				14		22
	Modesto	3				0		3
093420 - Industrial Electronics	Fresno City		16	1				17
	Merced	0						0
	Modesto	7				6	3	15
TOTAL		47	16	5	1	51	54	174

There is an undersupply of 146 electrician maintenance apprenticeship workers in the NCV/NML subregion and 422 workers in the region (Exhibit 12).

Exhibit 12. Electrician maintenance apprenticeship workforce demand (annual job openings), postsecondary supply of students (awards), and additional students needed to fill gap in the NCV/NML subregion and region



Student Outcomes

Exhibit 13 summarizes employment and wage outcomes from the California Community College Chancellor’s Cal-PASS Plus LaunchBoard for the TOP code related to electrician maintenance apprenticeship. Of note, 14 industrial electronics students received a degree or certificate or attained apprenticeship journey status; 75% of students obtained a job closely related to their field of study; 76% had a median change in earnings; and 75% of students attained a living wage.

Exhibit 13. Subregional metrics for the TOP code related to electrician maintenance apprenticeship

Metric	Electronics and Electric Technology 093400	Computer Electronics 093410	Industrial Electronics 093420
Students Who Got a Degree or Certificate or Attained Apprenticeship Journey Status	95	18	14
Number of Students Who Transferred	58	*	*
Job Closely Related to Field of Study	83%	100%	75%
Median Change in Earnings	29%	8%	76%
Attained a Living Wage	66%	49%	75%

* denotes data not available.

Conclusion

The entry-level wages of the five occupations exceed the NCV/NML subregion’s average living wage. There were 623 job postings in the past six months for occupations related to electrician maintenance apprenticeship in the subregion. Analysis of skills and certification requirements in job postings indicates:

- The top baseline skill is troubleshooting, and the top specialized skill is repair.
- The top software skill is Microsoft Excel.
- The top certification is a driver’s license.

There is an undersupply of trained workers, a shortage of 146 in the NCV/NML subregion and 422 in the region.

Recommendation

Based on these findings, it is recommended that Modesto Junior College work with the regional directors, the college’s advisory board, and local industry in the expansion of programs to address the shortage of electrician maintenance workers in the region.

Appendix A: Methodology & Data Sources

Data Sources

Labor market and educational supply data compiled in this report derive from a variety of sources. Data were drawn from external sources, including the Economic Modeling Specialists, Inc., the California Community Colleges Chancellor’s Office Management Information Systems Data Mart and the National Center for Educational Statistics (NCES) Integrated Postsecondary Education Data System (IPEDS). Below is the summary of the data sources found in this study.

Data Type	Source
Labor Market Information/Population Estimates and Projections/Educational Attainment	Economic Modeling Specialists, Intl. (EMSI). EMSI occupational employment data are based on final EMSI industry data and final EMSI staffing patterns. Wage estimates are based on Occupational Employment Statistics (QCEW and Non-QCEW Employees classes of worker) and the American Community Survey (Self-Employed and Extended Proprietors). Occupational wage estimates also affected by county-level EMSI earnings by industry: economicmodeling.com .
Typical Education Level and On-the-job Training	Bureau of Labor Statistics (BLS) uses a system to assign categories for entry-level education and typical on-the-job training to each occupation for which BLS publishes projections data: https://www.bls.gov/emp/tables/educational-attainment.htm .
Labor Force, Employment and Unemployment Estimates	California Employment Development Department, Labor Market Information Division: labormarketinfo.edd.ca.gov .
Job Posting and Skills Data	Burning Glass: burning-glass.com/ .
Additional Education Requirements/ Employer Preferences	The O*NET Job Zone database includes over 900 occupations as well as information on skills, abilities, knowledge, work activities and interests associated with specific occupations: onetonline.org .

Key Terms and Concepts

Annual Job Openings: Annual openings are calculated by dividing the number of years in the projection period by total job openings.

Education Attainment Level: The highest education attainment level of workers age 25 years or older.

Employment Estimate: The total number of workers currently employed.

Employment Projections: Projections of employment are calculated by a proprietary Economic Modeling Specialists, Intl. (EMSI) formula that includes historical employment and economic indicators along with national, state and local trends.

Living Wage: The cost of living in a specific community or region for one adult and no children. The cost increases with the addition of children.

Occupation: An occupation is a grouping of job titles that have a similar set of activities or tasks that employees perform.

Percent Change: Rate of growth or decline in the occupation for the projected period; this does not factor in replacement openings.

Replacements: Estimate of job openings resulting from workers retiring or otherwise permanently leaving an occupation. Workers entering an occupation often need training. These replacement needs, added to job openings due to growth, may be used to assess the minimum number of workers who will need to be trained for an occupation.

Total Job Openings (New + Replacements): Sum of projected growth (new jobs) and replacement needs. When an occupation is expected to lose jobs, or retain the current employment level, number of openings will equal replacements.

Typical Education Requirement: represents the typical education level most workers need to enter an occupation.

Typical On-The-Job Training: indicates the typical on-the-job training needed to attain competency in the skills needed in the occupation.